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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/855,073

05/14/2001

David Tucker

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04/27/2006

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EXAMINER

HENEGHAN, MATTHEW E

ART UNIT

PAPER NUMBER

2134

DATE MAILED: 04/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<p align="center">Office Action Summary</p>	Application No. 09/855,073		Applicant(s) TUCKER ET AL.	
	Examiner Matthew Heneghan		Art Unit 2134	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 March 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-57 is/are pending in the application.
 4a) Of the above claim(s) 11, 13-20, 24-42, 46, 47 and 54-57 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 12 and 21-23 is/are allowed.
- 6) ☒ Claim(s) 1-10, 43-45 and 48-53 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 December 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)</p> <p>2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)</p> <p>3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
 Paper No(s)/Mail Date _____</p> | <p>4) <input type="checkbox"/> Interview Summary (PTO-413)
 Paper No(s)/Mail Date. _____</p> <p>5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)</p> <p>6) <input type="checkbox"/> Other: _____</p> |
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DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submissions filed on 29 December 2005 and 2 March 2006 have been entered.

2. In response to the previous office action, claims 1, 10, 12, 21-23, 48, and 53 have been amended. Claims 1-10, 12, 21-23, 43-45, and 48-53 have been examined.

Drawings

3. The drawings were received on 29 December 2005. These drawings are acceptable.

Specification

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4. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: The limitation "...each candidate isomorph code functioning in substantially the same manner as..." as recited in several of the independent claims is not supported by the specification. The specification only teaches to code that is functionally isomorphic (see the examples in figure 10, for example, wherein multiple alternative isomorphs that do not function in substantially the same manner are presented for each of several functions), which does not necessarily function in substantially the same manner.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1-10, 43-45, and 48-53 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Applicant's original disclosure only teaches to the use of code that is functionally isomorphic, rather than code that functions in substantially the same manner, as is being recited in each of the

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independent claims. Each of these claims is being examined by ignoring the limitation introduced by the new matter.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-4 and 6-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over WIPO Patent Publication No. 99/01815 to Collberg et al. in view of U.S. Patent No. 6,480,959 to Granger et al.

Note: Granger was made of record in the office action mailed 20 May 2005.

As per claims 1 and 10, the system disclosed by Collberg takes compiled code and obfuscates (i.e. creates isomorphic code) it in a random manner when possible. In order to determine when obfuscation is possible, the code must be scanned (see abstract; p. 53, line 21 to p. 55, line 16; and p. 68 line 14 to p. 69, line 9). Collberg further discloses a set of isomorphic functions with which to replace the original functions (the example draw from the set of obfuscating transformations on p. 87, lines 6-7), and states that, in choosing the entry, "any number of heuristics can be used to

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select the most suitable transformation to apply to a particular source code object.” (see p. 90, lines 17-19).

Collberg does not disclose the random selection from the set of isomorphic codes.

Granger discloses the random selection of functions from a set of rules if more than one rule exists that can be applied to a piece of code (see column 21, lines 44-46 and column 22, lines 13-15), and suggests this makes it possible for many different software companies to use the same or similar obfuscation tools (see column 20, lines 52-59).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Collberg by randomly selecting an obfuscation to be applied, as disclosed by Granger, to make it possible for many different software companies to use the same or similar obfuscation tools.

As per claims 2 and 3, Collberg further discloses the combining of multiple types of transformations (at least three types are disclosed), thus creating later generation isomorphs (see p. 53, lines 10-19 and p.86, line 27 to p. 89, line 22).

As per claim 4, Collberg discloses the generation of different obfuscated versions of a program for different customers (see p. 98, lines 24-30).

As per claim 6, Collberg discloses Java® applications, which are generated at a server and executed on a client (see entire document).

As per claim 7, Collberg discloses the insertion of inert (benign) code (see p. 42, lines 4-27).

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As per claims 8 and 9, the system is implemented on a stand-alone system called "Kava," which may optionally use libraries (see p. 4, lines 13-15 and p. 25, line 25 to p. 26, line 15).

7. Claims 1 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,696,822 to Nachenberg in view of U.S. Patent No. 6,480,959 to Granger et al.

Nachenberg discloses that a polymorphic virus (i.e. self-replicating code) provides each new file with a mutated (obfuscated) version of the virus, as this frustrates most standard virus-detection schemes (see column 1, lines 11-17).

Nachenberg does not disclose the random selection from a set of isomorphic codes.

Granger discloses the random selection of functions from a set of rules if more than one rule exists that can be applied to a piece of code (see column 21, lines 44-46 and column 22, lines 13-15), and suggests this makes it possible for many different software companies to use the same or similar obfuscation tools (see column 20, lines 52-59).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Nachenberg by randomly selecting an obfuscation to be applied, as disclosed by Granger, to make it possible for many different software companies to use the same or similar obfuscation tools.

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8. Claims 48, 49, and 51-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,006,328 to Drake further in view of U.S. Patent No. 6,480,959 to Granger et al.

Regarding claims 48 and 49, Drake discloses the insertion of obfuscating code, which is isomorphic, in appropriate places. Scanning the code is necessary to determine such places (see column 5, line 37 to column 6, line 3). Drake also discloses the encryption of code after obfuscation, and notes that the encryption scheme used can be subjected to substantial variation (see column 16, lines 3-9).

Drake does not disclose the use of random algorithms.

Granger discloses the random selection of functions from a set of rules if more than one rule exists that can be applied to a piece of code (see column 21, lines 44-46 and column 22, lines 13-15), and suggests this makes it possible for many different software companies to use the same or similar obfuscation tools (see column 20, lines 52-59).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Collberg by randomly selecting an obfuscation to be applied, as disclosed by Granger, to make it possible for many different software companies to use the same or similar obfuscation tools.

Regarding claim 51, Drake discloses a symmetric algorithm, DES, as an exemplary encryption algorithm; the combination of Drake and Granger therefore would offer a symmetric algorithm.

Regarding claim 52, the invention of Drake is intended for try-before-you-buy software (see column 3, lines 1-6).

Regarding claim 53, Drake discloses the use of a signature key (a checksum) which prevents the successful decryption if the code has been tampered with (see column 16, lines 44-48).

9. Claim 50 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,006,328 to Drake further in view of U.S. Patent No. 6,480,959 to Granger et al. as applied to claim 48 further in view of U.S. Patent No. 5,966,450 to Hosford et al.

Drake and Granger do not disclose the usage of a previous result for key generation.

Hosford discloses the results from previous iterations to generate keys (see column 5, lines 43-55), and further suggests that this increase the difficulty of unauthorized decryption (see column 4, lines 5-11).

Therefore it would be obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Drake and Granger by using the results from previous iterations to generate keys, as disclosed by Hosford, as this increase the difficulty of unauthorized decryption.

Allowable Subject Matter

10. Claims 12 and 21-23 are allowed.

11. The following is an examiner's statement of reasons for allowance: Though Granger also discloses obfuscation using original CPU instructions, the matchable data structure ("rules" in Granger) is not randomly generated during the initialization of the application, and no art could be found in which this would be the case.

12. Claims 43-45 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 1st paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims, for the reasons stated in the previous office action.

13. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

14. Applicant's arguments with respect to claim 1 et al. have been considered but are moot in view of the new grounds of rejection. It appears that the amendments introduced to claim 1 et al. teach to matter that is more closely related to Granger than

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to Venkatesan, which was cited previously. The grounds of rejection are therefore being changed.

15. Applicant's arguments, see Remarks, filed 2 March 2006, with respect to claims 12 and 21-23 have been fully considered and are persuasive in view of Applicant's amendments. The rejections of claims 12 and 21-23 have been withdrawn.

Conclusion

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew E. Heneghan, whose telephone number is (571) 272-3834. The examiner can normally be reached on Monday-Friday from 8:30 AM - 4:30 PM Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jacques Louis-Jacques, can be reached at (571) 272-6962.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
P.O. Box 1450
Alexandria, VA 22313-1450

Or faxed to:

(571) 273-3800

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-2100.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MEH

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April 25, 2006

Jaime Kai Jagan
JUL 14 2006
Patent Office